Advanced Research Projects Agency • ENERGY

BEEST PROJECT

SION POWER

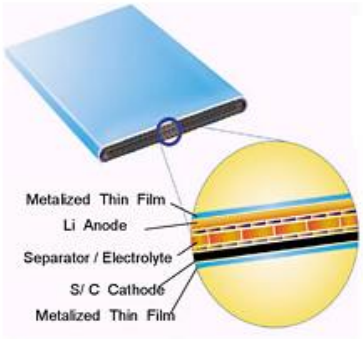
LITHIUM-SULFUR BATTERIES

PROJECT TITLE:	Development of High Energy Lithium-Sulfur Cells for Electric Vehicle Applications		
ORGANIZATION:	Sion Power Corporation	LOCATION:	Tucson, AZ
PROGRAM:	BEEST	ARPA-E AWARD:	$5,000,000
TECH TOPIC:	Energy Storage: Portable	PROJECT TERM:	10/1/10 – 9/30/13
WEBSITE:	www.sionpower.com		

CRITICAL NEED

Most of today's electric vehicles (EVs) are powered by lithium-ion (Li-Ion) batteries—the same kind of batteries used in cell phones and laptop computers. Most Li-Ion battery packs have a driving range limited to 100 miles on a single charge and account for nearly 65% of the total cost of EVs. To compete in the market with gasoline-based vehicles, EVs must cost less and drive farther. An EV that meets forecasted consumer demands would require a battery with twice the energy storage of today's state-of-the-art Li-Ion battery at 30% of the cost.

PROJECT INNOVATION + ADVANTAGES



Sion Power is developing a lithium-sulfur (Li-S) battery, a potentially cost-effective alternative to the Li-Ion battery that could store 400% more energy per pound. All batteries have 3 key parts—a positive and negative electrode and an electrolyte—that exchange ions to store and release electricity. Using different materials for these components changes a battery's chemistry and its ability to power a vehicle. Traditional Li-S batteries experience adverse reactions between the electrolyte and lithium-based negative electrode that ultimately limit the battery to less than 50 charge cycles. Sion Power will sandwich the lithium- and sulfur-based electrode films around a separator that protects the negative electrode and increases the number of charges the battery can complete in its lifetime. The design could eventually allow for a battery with 400% greater storage capacity per pound than Li-Ion batteries and the ability to complete more than 500 recharge cycles.

IMPACT

If successful, Sion Power's project would encourage production of low-cost, high-energy, rechargeable Li-S batteries, contributing to the widespread adoption of EVs. Improving the number of recharge cycles limits battery replacements, saving drivers money.

- SECURITY: Increased use of EVs would decrease U.S. dependence on foreign oil—the U.S. spends nearly $1billion per day on oil.
- ENVIRONMENT: Greater use of EVs would reduce greenhouse gas emissions, 28% of which come from the transportation sector.
- ECONOMY: This battery would enable an EV to travel from Chicago to St. Louis (300 miles) on a single charge, for less than $10 on average.
- JOBS: This project would help position the U.S. as a leader in rechargeable battery manufacturing. Currently, the U.S. manufactures only a small percentage of all rechargeable batteries, despite inventing the majority of battery technologies.

CONTACTS

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Partner Organizations:
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